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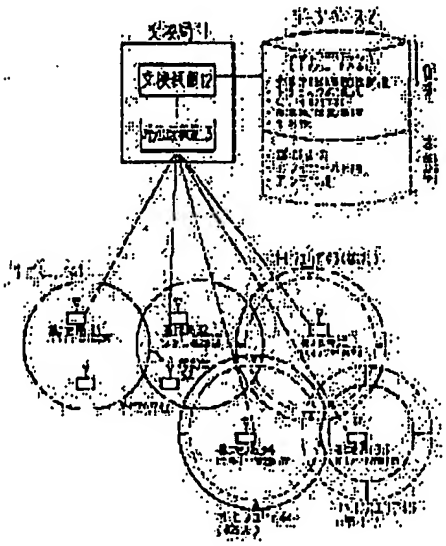
(54) FREQUENCY ARRANGEMENT CONTROL SYSTEM



(57)Abstract:
PURPOSE: To reduce man-hour of a check job of frequency arrangement by varying an equipment parameter for a base station and its adjacent station so as to cope with increase in number of waves of the base station and with increase in number of stations.
CONSTITUTION: The algorithm (control) varying an equipment parameter of a base station such as a new transmission output, a tilt angle of antenna directivity and a height of the antenna is added to the algorithm calculating a desired power versus interference power ratio CIR for a talking use radio frequency signal f5 allocated attended with increase/decrease in the traffic between an optional radio base station 32 and a mobile equipment 52, a radio frequency arrangement for communication of all conventional base stations and its setting processing. Thus, the frequency arrangement for communication of each base station is automatically decided with respect to the increase/decrease in the traffic of the mobile station 52 by a conventional optional base station 32, the frequency arrangement of the communication decided is as it is and the service area with respect to each mobile equipment of a base station 35 and adjacent base stations 33, 34 is changed to avoid the change of the frequency arrangement for communication.

LEGAL STATUS

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CLAIMS

[Claim(s)]

[Claim 1] A migration machine with the function of the radio frequency signal the object for the control for connection with the function and base transceiver station which the subscriber of a system uses as a telephone, and for a message of transmission and reception (51), It has the function of an interface with the exchange which exchanges this call signal between the common telephones of control between these migration machines, the function of the radio frequency signal which is a call signal of a message of transmission and reception, and an external cable system. From a cable system to a wireless system to the cable system from a wireless system again a signal With the migration communication system which consists of the exchange (11) which performs control of two or more base transceiver stations (31-35) changed and relayed and two or more of these base transceiver stations, and exchange of a message Count of the radio frequency signal for a message assigned with the change in the traffic between the migration machines (52) of the base station (32) of the arrangement, its setting processing, and arbitration of the radio frequency for all messages of two or more of said base stations (31-35) necessary [CIR] (wave power pair interference power ratio of choice) In a frequency configuration control method with the algorithm performed for

every service area of each base station the radio frequency for this allocation **** message (f1) -- as it is -- ** -- by carrying out, changing only the device parameter of a certain base station (35) and the base station (33 34) which adjoins this station, and changing each service area The frequency configuration control method characterized by securing CIR of the radio frequency signal (f5) for the message of the base station (32) of said arbitration, and corresponding to fluctuation of traffic with a migration machine (52).

[Claim 2] The frequency configuration control method according to claim 1 characterized by performing changing the service area of the aforementioned base station (35) and an adjoining base station (33 34) by changing the transmitting output of this base station.

[Claim 3] The frequency configuration control method according to claim 1 characterized by performing changing the service area of the aforementioned base station (35) and an adjoining base station (33 34) by changing the directive tilt angle of the antenna of this base station.

[Claim 4] The frequency configuration control method according to claim 1 characterized by performing changing the service area of the aforementioned base station (35) and an adjoining base station (33 34) by changing the height of the antenna of this base station.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the frequency configuration control method which is the approach of controlling allocation of the radio frequency for a message applied to the migration communication system which has two or more base transceiver stations to mobile stations, such as a land mobile radiotelephone system.

[0002]

[Description of the Prior Art] Conventionally, it is based on prediction of the construction plan of a base transceiver station, and the traffic of a mobile station at the time of installation of migration communication system. Drawing 3 (a) As shown in the original frequency plot plan, to for example, five base transceiver stations 31-35 In all, the radio frequencies f1-f4 of four pieces were first carried out to control of each base station among the radio frequencies f1-f12 of 12 pieces, and the radio frequencies f5-f12 of remaining eight pieces were carried out to the message, and were assigned fixed two every frequencies each. And when extension (it is extension of the message frequency of three pieces in a base station 32 with drawing) of the message frequency of the base transceiver station besides a plan is needed Drawing 3 As shown in the frequency plot plan after (b) modification, they are other base stations 31, 33, 34, and 35. It leaves each objects f1 and f3 for control, f4, and f1 first. The object for a message is reduced in one frequencies f5, f9, f11, and f5 each, and they are five frequencies f7, f8, f6, f10, and f12 about a message frequency in the base station 32 concerned. It increased and the radio

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frequencies f5-f12 of eight pieces for a message were rearranged.
[0003]
[Problem(s) to be Solved by the Invention] Since arrangement of the radio frequency for the message of each base transceiver station was conventionally assigned fixed like ****, at increase of traffic with the mobile station of a certain base station, and the new time of extension of a base station, there was a problem that arrangement of all the radio frequencies for a message had to be improved from the start. Arrangement of the radio frequency for a message by which the purpose of this invention is already assigned to each base station at the time new in the traffic between the mobile stations of the base station of arbitration increasing of extension of a base station is made eternal as it is, and it is in offering the frequency configuration control method which can cope with it according to the actual condition.
[0004]
[Means for Solving the Problem] The basic configuration of this invention for this purpose achievement is shown in the principle Fig. of drawing 1 . The object for the control for the function as a telephone which the subscriber of a system uses, and connection with a base transceiver station, and the migration machine 51 with the function of the radio frequency signal for a message of transmission and reception, This migration machine 51 Two or more base transceiver stations 31-35 which change into a cable system from a wireless system, and are relayed from a cable system to a wireless system again with the function of an interface with the exchange which exchanges a call signal between the common telephones of control between **, the function of the radio frequency signal which is a call signal of a message of transmission and reception, and an external cable system, In the migration communication system which consists of the exchange 11 which performs control of two or more of these base transceiver stations, and exchange of a call signal The necessary wave power pair interference power ratio CIR of choice of the radio frequency signal f5 for a message assigned with the change in the traffic between arrangement and setting processing of the radio frequency for a message to all the conventional base stations, and the migration machine 52 of the base station 32 of arbitration In addition to the conventional algorithm which calculates the service area (radius) of each base station as fixed, allocation of the radio frequency for the message to all base stations remains as it is. ** Add the algorithm (control) to which only the device parameter of base stations, such as a transmitting output, a directive tilt angle of ** antenna, and height of ** antenna, is changed. By securing easily CIR of the radio frequency signal f5 for the message of the base station 32 of said arbitration, it constitutes from changing the service area of some base station 35 and base stations 33 and 34 of the contiguity so that it may be made to correspond to the change in the traffic between the migration machines 52.
[0005]
[Function] The algorithm (control) which changes the device parameter of base stations, such as new ** transmitting output, a directive tilt angle of ** antenna, and height of ** antenna, in this invention By being added to the algorithm which calculates necessary CIR of the radio frequency signal f5 for a message assigned with the change in the traffic

between the radio frequency arrangement for the message of all the conventional base stations, its setting processing, and the migration machine 52 of the base transceiver station 32 of arbitration Frequency arrangement for a message which it could opt for the frequency arrangement for the message of each base station automatically to the change in the traffic of the migration machine 52 of the base station 32 of the conventional arbitration, and also was decided is left intact. It is necessary to cease to change the frequency arrangement for a message by **** of the base station 32 besides a plan by changing the service area to each migration machine of a certain base station 35 and the adjoining base stations 33 and 34. Moreover, when the base station 35 which carried out the increase office becomes a failure, it also becomes possible for the adjoining base stations 33 and 34 to extend a service area by changing the device parameter of above-mentioned this invention; and to cover the service area of the aforementioned failure base station 35.

[0006]

[Example] The principle Fig. of drawing 1 shows the configuration of the frequency configuration control method of the example of this invention as it is, and shows the outline sequence of the conventional actuation for the explanation of operation to drawing 2 . With the configuration of drawing 1 , the control channels f1-f4 which transmit frequency f5 - for a message assigned from its magnitude and exchange 11 of service areas 41-45 at any time to base stations 31-35 to each migration machine 51 and 52 - are assigned according to the individual. And when there is a call request of the migration machine 52 like the outline sequence of drawing 2 in the service area 42 of a base station 32, the allocation demand of the frequency for a message is notified to the call processor 13 of the exchange 11 using a control channel f2 from this base station 32. A call processor 13 receives the demand and the radio frequency f5 for a message assigned to the migration machine 52 to a swap device 12 using the database 21 out of all the radio frequencies for the message to own (for example, radio frequencies f5-f12 of eight pieces) is determined. A swap device 12 notifies the frequency f5 for a message assigned to the determined migration machine 52 to a call processor 13 by the control channel f2, and a call processor 13 makes the communication link between the migration machines 52 use the frequency f5 for a message for a base station 32. When the message between the migration machine 52 and a base station 32 is completed, a call processor 13 notifies that to a swap device 12, and cancels the frequency f5 for a message which was being assigned to the migration machine 52 to it with the database 21. While the traffic volume of the service area 42 of a base station 32 is increasing, (namely, when arranging many frequencies for a message) When the traffic volume of the service area 45 of a base station 35 has also increased Since there are few radio frequencies for a message to assign, by changing device parameters, such as ** transmitting output of this base station 35, a directive tilt angle of ** antenna, and height of ** antenna The traffic volume in the self-service area 45 is compulsorily reduced by making the service area 45 of this base station 35 reduce, and they are other base stations (for example, base station 32). The radio frequency signal f5 for a message enables it to secure necessary CIR. radio frequency f5- for a message which it was required from each base station by such

approach in the database 21 with the total radio frequency for a message which can be assigned, and was assigned by it -- it corresponds to increase of the traffic volume of said base station 32 by contraction of the service area 45 of a base station 35, with f12 fixed. Moreover, base stations 33 and 34 which adjoin the service area 45 of a base station 35 in order to prevent generating of the blind zone of the migration machine near the boundary of the old service area 45 by having made the service area 45 of a base station 35 reduce Each service areas 43 and 44 Magnitude is expanded to coincidence by changing said device parameter.

[0007]

[Effect of the Invention] according to [as explained above] this invention -- the time of **** of a certain base station -- and -- an increase -- an office -- the time -- since it can be coped with only by changing the device parameter of this base station and a contiguity station, without rearranging the frequency for a message, the man day of the examination activity of frequency arrangement is reducible. Moreover, the effectiveness it is ineffective to it being possible to perform relocation of the radio frequency for the message of each base station to modification and coincidence of the service area of a certain base station is also acquired.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The principle Fig. showing the basic configuration of the frequency configuration control method of this invention

[Drawing 2] The outline sequence diagram of the conventional actuation for explaining actuation of this invention

[Drawing 3] The explanatory view of the conventional frequency configuration method

[Description of Notations]

f1-f4 are a radio frequency for control, and f5-f12. For a call processor and 21, a database, and 31-35 are [the radio frequency for a message, and 11 / the exchange and 12 / a swap device and 13] a base station, and 51 and 52. A migration machine, and 41-45 are service areas.

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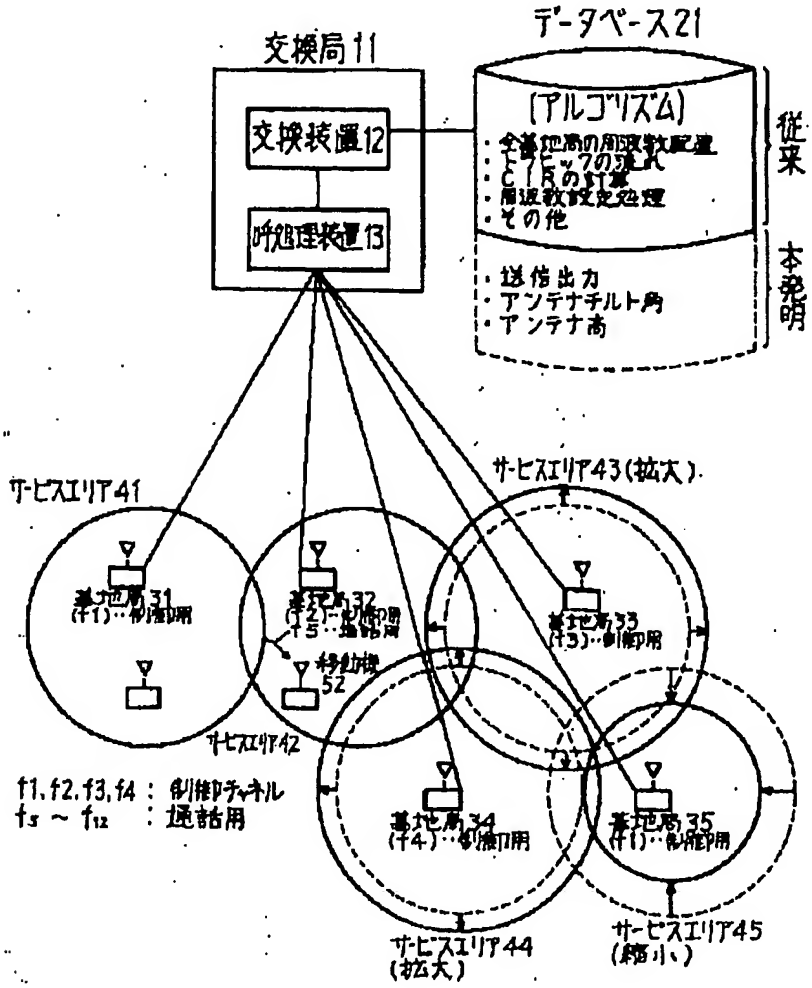
DRAWINGS

[Drawing 1]
本発明の周波数割当制御方式の基本構成を示す原理図



基地局35 : 送信出力の低下制御、アンテナチルト角を下に向ける、又はアンテナ高を下げる。
基地局33、34 : 送信出力の増加制御、アンテナチルト角を上に向ける、又はアンテナ高を上げる。

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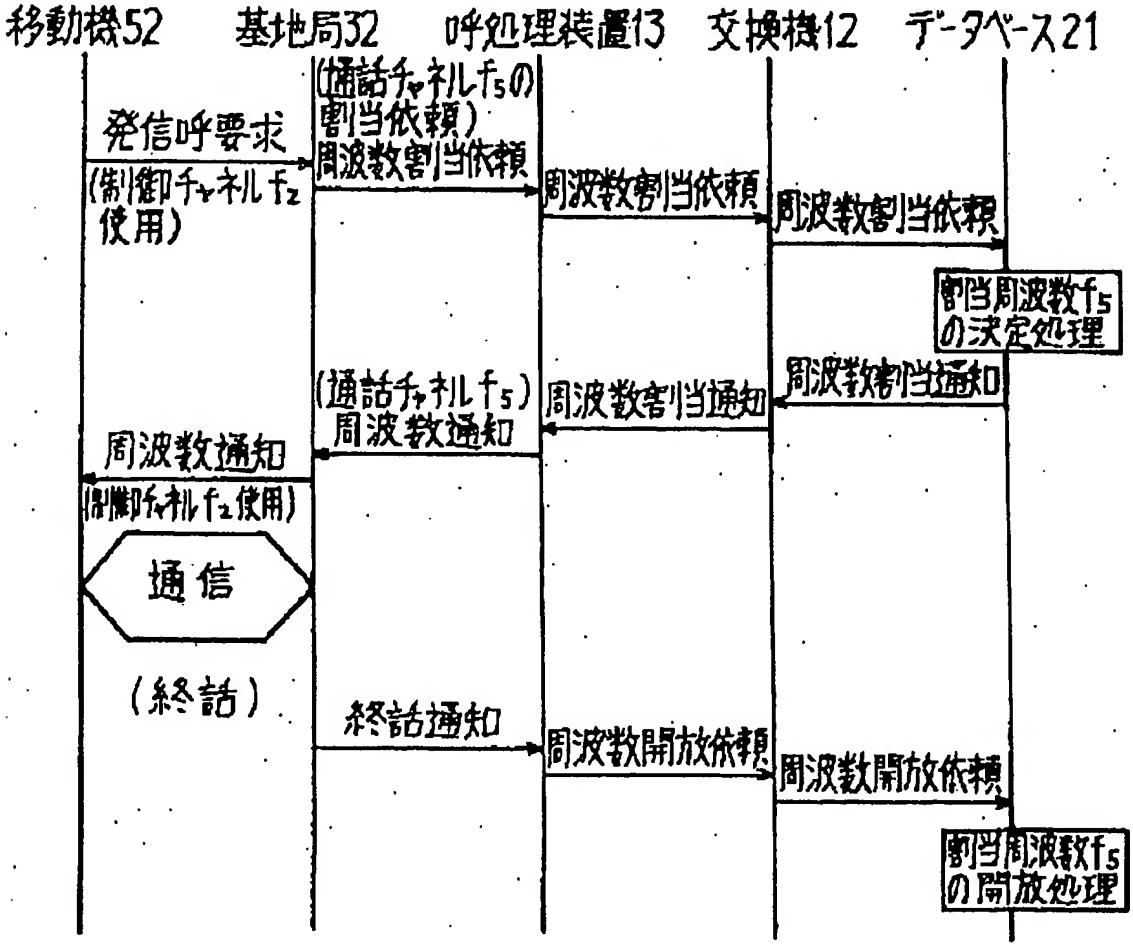
[Drawing 2]

本発明の動作を説明するための従来動作の概略シーケンス図



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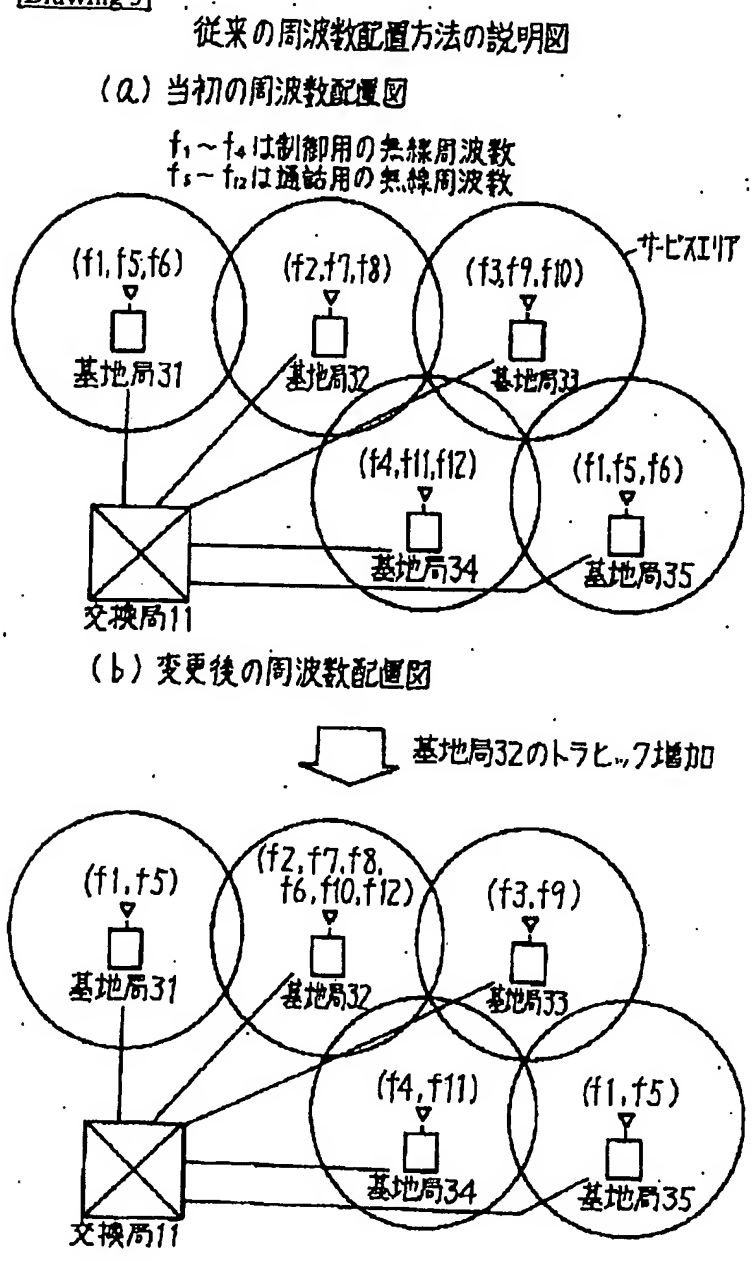
[Drawing 3]



[Translation done.]

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(43)公開日　平成6年(1994)5月20日

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Ｈ０４Ｂ　7/26	１０５　Ｄ	7304－5K		
	１０４　Ａ	7304－5K		

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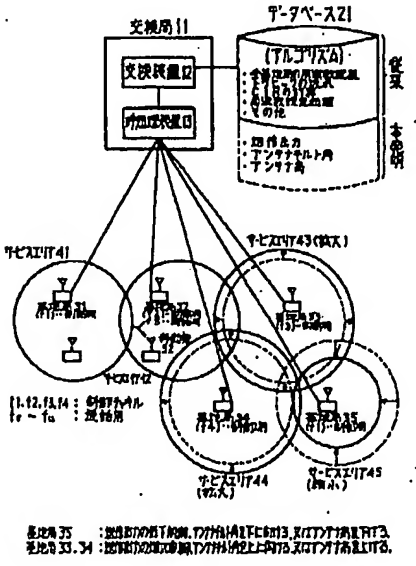
(54)【発明の名称】　周波数配置制御方式

(57)【要約】　（修正有）
【目的】　移動局との間のトラヒックの増大や基地局の増設の時に、割り当て周波数を変更せずに対処できる周波数配置制御方式を提供する。
【構成】　複数の基地局(31～35)の全部の通話用の無線周波数の配置とその設定処理と任意の基地局(32)の移動機(52)との間のトラヒックの増減に伴い割り当てられる通話用の無線周波数信号(f_i)の所要ＣＩＲの計算を各基地局のサービスエリア毎に行う周波数配置制御方式において、通話用の周波数(f_i)の割当てをそのままとし、①送信出力、②アンテナの指向性のチルト角、③アンテナの高さ等の基地局(35)の装置パラメータのみを変化させ、或る基地局35と隣接する基地局33，34の装置のパラメータを変えサービスエリアを変えることで任意の基地局32の通話用の無線周波数信号f_iのＣＩＲを確保し、移動機52との間のトラヒックの変動に対応するように構成する。

本発明の周波数割当制御方式の基本構成を示す原理図



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【特許請求の範囲】

【請求項１】　システムの加入者が電話として使用する機能および無線基地局との接続のための制御用と通話用の無線周波数信号の送受信の機能を持つ移動機(51)と、該移動機との間の制御と通話の呼信号である無線周波数信号の送受信の機能および外部の有線系の一般電話機との間で該呼信号を交換する交換局とのインタフェースの機能を持ち有線系から無線系へ又無線系から有線系へ信号を変換し中継する複数の無線基地局(31～35)と、該複数の無線基地局の制御及び通話の交換を行う交換局(11)とからなる移動通信システムで、前記複数の基地局(31～35)の全部の通話用の無線周波数の配置とその設定処理と任意の基地局(32)の移動機(52)との間のトラヒックの増減に伴い割当てられる通話用の無線周波数信号の所要ＣＩＲ（希望波電力対干渉電力比）の計算を各基地局のサービスエリア毎に行うアルゴリズムを持つ周波数配置制御方式において、該割当てられた通話用の無線周波数(f_i)をそのままとし、或る基地局(35)と該局に隣接する基地局(33,34)の装置パラメータのみを変えて各々のサービスエリアを変えることで、前記任意の基地局(32)の通話用の無線周波数信号(f_i)のＣＩＲを確保して移動機(52)とのトラヒックの変動に対応することを特徴とした周波数配置制御方式。

【請求項２】　前記の基地局(35)と隣接の基地局(33,34)のサービスエリアを変えることが、該基地局の送信出力を変えることで行われることを特徴とした請求項１記載の周波数配置制御方式。

【請求項３】　前記の基地局(35)と隣接の基地局(33,34)のサービスエリアを変えることが、該基地局のアンテナの指向性のチルト角を変えることで行われることを特徴とした請求項１記載の周波数配置制御方式。

【請求項４】　前記の基地局(35)と隣接の基地局(33,34)のサービスエリアを変えることが、該基地局のアンテナの高さを変えることで行われることを特徴とした請求項１記載の周波数配置制御方式。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、自動車電話システム等の移動局に対して複数の無線基地局を有する移動通信システムに適用される通話用の無線周波数の割当を制御する方法である周波数配置制御方式に関するものである。

【０００２】

【従来の技術】従来は、移動通信システムの導入時に、無線基地局の建設計画および移動局のトラヒックの予測に基づいて、図３の (a)当初の周波数配置図に示す如く、例えば５つの無線基地局31～35に、全部で12個の無線周波数f_1～f_{12}のうち、先ず４個の無線周波数f_1～f_4を各基地局の制御用とし、残り８個の無線周波数f_5～f_{12}を通話用として各２周波数づつ固定的に割当てていた。そして計画外の無線基地局の通話周波数の増設（図

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では基地局32で３個の通話周波数の増設)が必要となった場合は、図３の (b)変更後の周波数配置図に示す如く、他の基地局31,33,34,35 で先ず各制御用f_1, f_2, f_3, f_4を残し、通話用を各１周波数f_5, f_6, f_{11}, f_{12}に減らし、当該基地局32で通話周波数を５周波数f_7, f_8, f_9, f_{10}, f_{12}に増やして、通話用の８個の無線周波数f_5～f_{12}の再配置を行っていた。

【０００３】

【発明が解決しようとする課題】従来は、上述の如く、各無線基地局の通話用の無線周波数の配置を固定的に割当てていた為に、或る基地局の移動局とのトラヒックの増大や、新たな基地局の増設の時には、通話用の全部の無線周波数の配置を初めから見直さねばならないという問題があった。本発明の目的は、任意の基地局の移動局との間のトラヒックが増大したり新たな基地局の増設の時に、各基地局に既に割り当てられている通話用の無線周波数の配置はそのまま不変とし、実情に合わせて対処できる周波数配置制御方式を提供することにある。

【０００４】

【課題を解決するための手段】この目的達成のための本発明の基本構成を、図１の原理図に示す。システムの加入者が使用する電話としての機能および無線基地局との接続のための制御用と通話用の無線周波数信号の送受信の機能を持つ移動機51と、該移動機51との間の制御と通話の呼信号である無線周波数信号の送受信の機能および外部の有線系の一般電話機との間で呼信号を交換する交換局とのインタフェースの機能を持ち有線系から無線系へ又無線系から有線系へ変換し中継する複数の無線基地局31～35と、該複数の無線基地局の制御及び呼信号の交換を行う交換局11とからなる移動通信システムにおいて、従来の全基地局に対する通話用の無線周波数の配置とその設定処理と任意の基地局32の移動機52との間のトラヒックの増減に伴い割当てられる通話用の無線周波数信号f_iの所要の希望波電力対干渉電力比ＣＩＲを、各基地局のサービスエリア（半径）を一定として計算する従来のアルゴリズムに加え、全基地局への通話用の無線周波数の割当はそのままで、①送信出力、②アンテナの指向性のチルト角、③アンテナの高さ等の基地局の装置パラメータのみを変化させるアルゴリズム（制御）を追加し、或る基地局35と其の隣接の基地局33,34 のサービスエリアを変えることで、前記任意の基地局32の通話用の無線周波数信号f_iのＣＩＲを容易に確保することにより、移動機52との間のトラヒックの増減に対応させるように構成する。

【０００５】

【作用】本発明では、新規の①送信出力、②アンテナの指向性のチルト角、③アンテナの高さ等の基地局の装置パラメータを変えるアルゴリズム（制御）が、従来の全基地局の通話用の無線周波数配置とその設定処理と任意の無線基地局32の移動機52との間のトラヒックの増減に

伴って割当てられる通話用の無線周波数信号f_iの所要のＣＩＲを計算するアルゴリズムに追加されることにより、従来の任意の基地局32の移動機52のトラヒックの増減に対して各基地局の通話用の周波数配置を自動的に決めることが出来る他に、決まった通話用の周波数配置をそのままとして、或る基地局35と隣接の基地局33,34の各移動機に対するサービスエリアを変えることにより、計画外の基地局32の増波による通話用の周波数配置を変えないで済むようになる。また、増局した基地局35が障害となった場合には、隣接の基地局33,34が上記の本発明の装置パラメータを変えることでサービスエリアを拡げて前記の障害基地局35のサービスエリアをカバーすることも可能となる。

【０００６】

【実施例】図１の原理図はそのまま本発明の実施例の周波数配置制御方式の構成を示し、図２に其の動作説明の為の従来動作の概略シーケンスを示す。図１の構成では、基地局31～35には、随時自分のサービスエリア41～45の大きさや交換局11から割当てられた通話用周波数f_i一を各移動機51,52 一へ伝達する制御チャネルf_1～f_4が個別に割当てられている。そして図２の概略シーケンスの如く、例えば基地局32のサービスエリア42にて、移動機52の発呼要求があった場合は、該基地局32より交換局11の呼処理装置13へ通話用の周波数の割当要求を制御チャネルf_2を用いて通知する。呼処理装置13は其の要求を受け、交換装置12に対し其のデータベース21を利用して其の所有する通話用の全部の無線周波数（例えば８個の無線周波数f_1～f_{12}）の中から移動機52に割当てる通話用の無線周波数f_iを決定する。交換装置12は決定した移動機52に割当てる通話用の周波数f_iを呼処理装置13へ制御チャネルf_2で通知し、呼処理装置13は基地局32に移動機52との間の通信に其の通話用周波数f_iを使用させる。移動機52と基地局32との間の通話が終了した時は、呼処理装置13はその旨を交換装置12へ通知し、データベース21により移動機52へそれ迄割り当てていた通話用周波数f_iを解除する。基地局32のサービスエリア42のトラヒック量が増大している時（即ち通話用周波数を多く配置している時）に、基地局35のサービスエリア45のトラヒック量も増大して来た場合は、割当てる通話用の無線周波数が少ないことから、該基地局35の①送信出力、②アンテナの指向性のチルト角、③アンテナの高さ等の装置パラメータを変えることにより、該基地局35のサービスエリア45を縮小させることで自サービスエリア45内のトラヒック量を強制的に削減し、他の基地局（例えば基地局32）の通話用の無線周波信号f_iが所要のＣＩＲを確保できるようにする。この様な方法により、割当可能な通話用の全無線周波数を持つデータベース21にて、各基地局から要求され割り当てた通話用の無線周波数f_i一f_{12}を一定にしたまま、基地局35のサービスエリア45の縮小により前記基地局32のトラヒック量の増大に対応する。又、基地局35のサービスエリア45を縮小させたことによる旧サービスエリア45の境界近くの移動機の不感地帯の発生を防ぐ為に、基地局35のサービスエリア45に隣接する基地局33,34 の各サービスエリア43,44 の大きさを前記装置パラメータを変えることで同時に拡大する。

【０００７】

【発明の効果】以上説明した如く、本発明によれば、或る基地局の増波時および増局時に、通話用の周波数の再配置を行わずに、該基地局と隣接局の装置パラメータを変えることのみで対処できるので、周波数配置の検討作業の工数を削減できる。また、各基地局の通話用の無線周波数の再配置を、或る基地局のサービスエリアの変更と同時に実行することが可能となる効果も得られる。

【図面の簡単な説明】

【図１】　本発明の周波数配置制御方式の基本構成を示す原理図

【図２】　本発明の動作を説明するための従来動作の概略シーケンス図

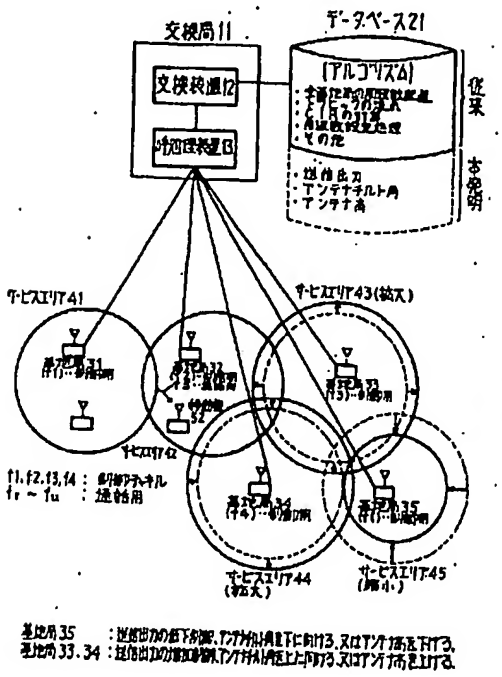
【図３】　従来の周波数配置方法の説明図

【符号の説明】

f_1～f_4は制御用の無線周波数、f_1～f_{12}は通話用の無線周波数、11は交換局、12は交換装置、13は呼処理装置、21はデータベース、31～35は基地局、51,52 は移動機、41～45はサービスエリアである。

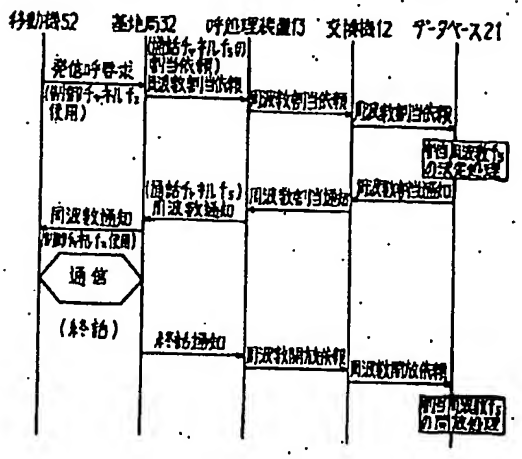
【図1】

本発明の周波数割当制御方式の基本構成を示す原理図



【図2】

本発明の動作を説明するための従来動作の概略シーケンス図



【図3】

従来の周波数配置方法の説明図